



# DDP

## Digital Drive Processor

user's manual



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# 1. Introduction

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Dear customer,

Congratulations on your purchase of an Alcons Audio DDP Digital Drive Processor, and thank you for your confidence in Alcons products. We are very honoured to welcome you to the growing family of Alcons ambassadors!

For your safety, please read the Important safety instructions and the Precautions section before installing and operating the module.

The DDP Digital Drive Processor is a professional digital loudspeaker drive controller. The DDP is designed to guarantee the best loudspeaker drive, with maximum sound- and operating reliability. The module contains a powerful 120 MIPS DSP engine combined with state of the art AD and DA converters to give you the ultimate in sound quality.

In order to maintain strict quality standards, all Alcons products are burned-in and thoroughly tested before shipping. The proven combination of advanced design, quality construction and active protection circuits is your guarantee of fail-safe reliability and many years of trouble-free operation, while enjoying the excellent specifications. You can depend on consistent, stable performance, even in the most demanding fixed or mobile sound reinforcement applications.

## **DDP features**

### **24bit 96kHz Converters**

State of the art AD and DA converters are used to obtain maximum sound quality and dynamic range.

### **System preset settings for all available Alcons systems**

The DDP provides system controlling and optimizing, with presets for all available Alcons systems and system configurations. Simply select the correct speaker and speaker configuration and all parameters are



# 1. Introduction

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set to give the best sonic performance; protection, dedicated filtering and optimised system response.

The Intelligent Driver Guidance IDG™ processing offers optimized power response through "True-RMS" intelligent power limiting guidance and (separate) excursion limiting guidance.

Crossover filtering consists of dedicated, hybrid Bessel, Butterworth or Linkwitz-Riley responses.

The optimization of the system's response is taken care of by factory-set dedicated driver alignment and system configuration equalising a.o.

## **Parametric Equaliser**

Equalising can be done through 4-bands of parametric equalising per channel; Each band provides +12 dB to -20 dB gain at frequencies ranging from 20 Hz to 20 kHz, with 12 steps per octave. Each band can also act as notch-filter. The filters feature CSQ™ (Constant & Symmetrical Q), with a selectable Q from 0.3 to 15, in 38 steps.

## **Delay function**

Per channel there is also a user-definable delay function; The delay can be set from 0.1 to 293 milliseconds, or from 0.01 to 99.6 meters.

## **User presets**

Up to 99 user-presets can be made, consisting of factory system preset, gain, input-mode, equalising and delay. These presets can be tagged with a 21-character name which is shown at the top of the main menu.

# 1. Introduction

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## **Limit Log™**

The DDP provides real-time signal logging with a visual tracing report on the dB limiting of the selected system. With up to 430.000 minute samples, a usage history of more than 7.000 operating hours can be read out. Furthermore the log stores the number of amp-starts, on time, signal present time and limiting time of the amplifier.

## **Input matrix**

Each amplifier channel can be routed to any amplifier input, or to both inputs summed.

## **Lock function**

All selectable functions of the DDP, except for the mute function, can be locked with a 4 digit lock-code, or only a system preset lock can be applied.

## **Firmware updates**

Firmware updates can be performed via the side-located USB port; Dedicated boot-loader software makes the firmware updates internet-downloadable.

## 2. Important safety instructions \_\_\_\_\_

**Warning:** – To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Install in accordance with the manufacturer's instructions.
8. Only use attachments/accessories specified by the manufacturer.
9. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as, the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



The lightning flash with arrowhead symbol within a triangle, is intended to alert the user to the presence of uninsulated dangerous voltage within the enclosure that may be a risk of electric shock to humans.



The exclamation point within a triangle is intended to alert the user to the presence of important operating instructions in the literature accompanying the product.

# 3. Precautions

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- **Save the packing material.** Should you ever need to ship the module, use only the original packing.
- **Read this manual carefully before installing and operating.** Retain this documentation for future reference.
- **Do not use the module if there is visual damage to the enclosure.** Inspect the module before use. When in doubt, have the module inspected by authorized technical personnel.
- **Do not install the module to the amplifier while the amplifier is switched on.** Always shut off the amplifier when making connections to it, and mute the inputs when making connections to preceding equipment in the chain.
- **Do not spill water or any other liquid to or into the module.** Do not operate the amplifier or module if suspected or standing in liquid.
- **Do not remove the cover.** There are no user serviceable parts inside the module.
- **Refer servicing to qualified service personnel.** Servicing is required when the module has been damaged in any way, liquid has been spilled on or into the module, does not operate normally or has been dropped.

# 4. Installation

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## Unpacking

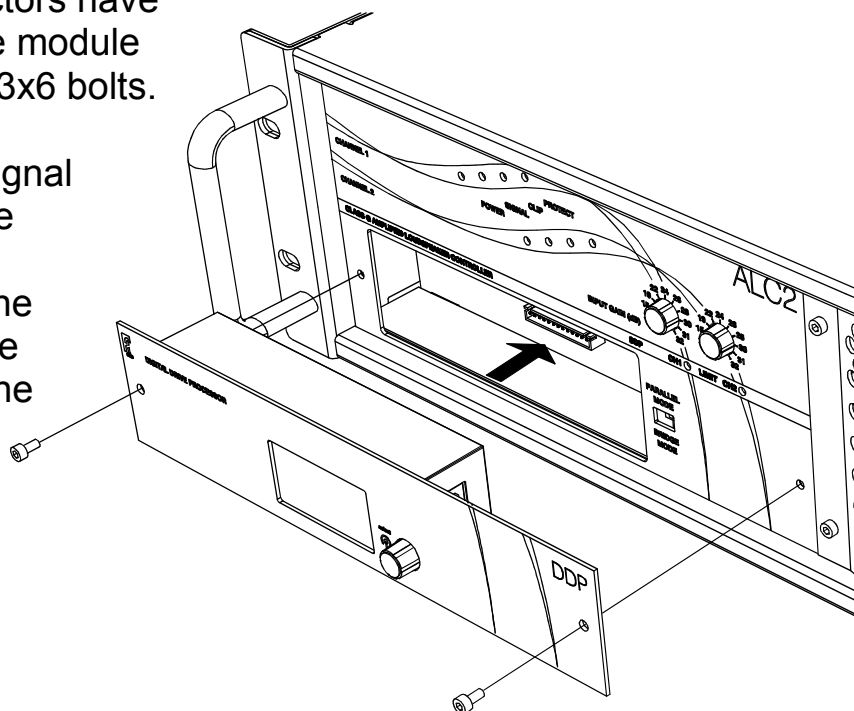
Carefully open the shipping carton and inspect the DDP. Every Alcons product is thoroughly tested and inspected before leaving the factory and should arrive in perfect condition. If you find any damage, notify the shipping company immediately. Only you, the consignee, may initiate a claim for shipping damage. Be sure to save all packing materials for the carrier's inspection.

Please save the packing material. If you ever need to ship the DDP back to your dealer or the factory, you should only use the original packing.

## Installation in the ALC amplifiers

To install the DDP module in your Alcons ALC amplifier, first switch off the amplifier and unscrew the cover on the front panel. Set the both the Parallel mode and the Bridge mode switch to the left hand OFF position. If the ALC is an –ST version turn both input gain controls completely clockwise to the 32 dB gain position. Place the DDP module in the space behind the cover, making sure the connectors have locked. Then secure the module with the two supplied M3x6 bolts.

The DDP controls the signal routing for parallel/active mode and bridge mode itself. This means that the parallel mode and bridge mode DIP-switches of the ALC amplifiers should always be in the left hand OFF position.





## 4. Installation

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As can be seen in the block diagram in chapter 9, the signal present indicators and the analogue level controls of the ALC amplifiers are prior to the DDP in the signal chain and thus relate to the channel1 and channel2 input channels, rather than the channel1 and channel2 output channels of the amplifier.

# 5. Operation

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## Powering the amplifier

When the ALC amplifier is switched on, the DDP comes up with its boot screen:



In the boot screen the Alcons logo, the device name and the current firmware version are displayed.

After approximately 2.5 seconds the module automatically switches to the main menu.

Pushing the DDP encoder while switching on the amplifier, makes the DDP start-up with both channels muted.

## Operating the encoder

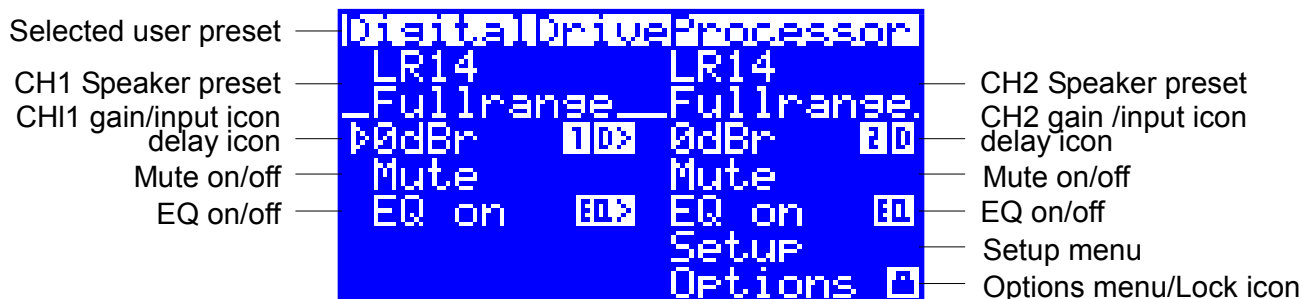
The encoder is a multi-functional switch, which can be turned to select and pushed to enter or exit a menu, or to confirm a setting. Turning the encoder clockwise moves the cursor/selection down, turning counter-clockwise moves the cursor/selection up.

## Cursors


- ▶ The filled cursor is displayed when the selected item can be accessed or modified by pushing and/or turning the encoder.
- ▶ The non-filled cursor is displayed when the selected item cannot be accessed or modified by pushing and/or turning the encoder.

# 5. Operation

## Main menu









The main menu shows the most important settings of the DDP in one screen and lets you control some important settings directly. The picture above shows the main menu for the DDP in 'Dual channel mode'. In 'Stereo mode', 'Bridged mono mode' and in '2-way active mode', the DDP switches to a single control section for the entire amplifier.

The top line shows the name of the selected user preset. If a preset is recalled and, after that, further adjustments are made, an asterisk,  is displayed in the top right corner of the display.

The speaker presets shows the selected Alcons loudspeaker system presets for channel1 and channel2.

Two gain controls adjust level for their respective amplifier channels. The controls are calibrated in dB's absolute gain for the entire amplifier, or in dBr's relative to the gain of the ALC amplifiers (+32 dB). Remember, that in bridged mono mode the voltage gain of the amplifier is multiplied by two, so you must add 6dB to the gain indication in relative mode. In absolute mode the DDP automatically indicates the correct gain.


To the right of the gain indication the ,  or  icon shows whether the input for that channel is taken from the channel1, the channel2 or the sum of the channel1 and channel2 XLR inputs with 6 dB attenuation. The  icon indicates the delay is active and the  icon indicates the channel2 delay is linked to the channel1 delay.

Finally, if the  icon is visible, it indicates the DDP is locked.

# 5. Operation



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## Mute

The mute function lets you mute the respective channel.  shown in reverse video capitals indicates the mute function is active.

Pushing the encoder and holding it down for more than 1 second immediately mutes both channels, regardless of the menu or function the DDP is in.

## EQ on/off

Toggles the parametric equaliser on and off. The  icon indicates the equaliser is active and the  icon indicates the channel2 equaliser is linked to the channel1 equaliser.

## Setup

Enters the setup menu.

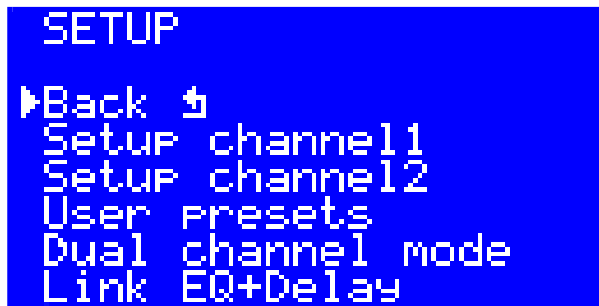
## Option

Enters the options menu.

# 5. Operation

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## Setup menu



In the setup menu, all the necessary settings for controlling the signal processing of the DDP can be made.

### Back

Returns to the main menu.

### Setup channel1/2

Enters the menus in which the Alcons loudspeaker system presets, the input routing, the equalisers and the delay function are controlled.

### User presets

Enters the user presets menu. In this menu you can store and recall up to 99 of your own user defined presets.

### Dual channel mode/Stereo mode/Bridged mono mode

This menu item switches the DDP between 'Dual channel mode', 'Stereo mode' and "Bridged mono mode".

In 'Dual channel mode', you can use the amplifier as two independent mono amplifiers.

In 'Stereo mode', The DDP copies all channel1 settings to channel2 and switches to a single control in the main menu. In this mode the power limiters of channel1 and channel2 are linked to preserve stereo imaging.

In 'Bridged mono mode', The amplifier becomes a single channel amplifier with double output voltage swing.

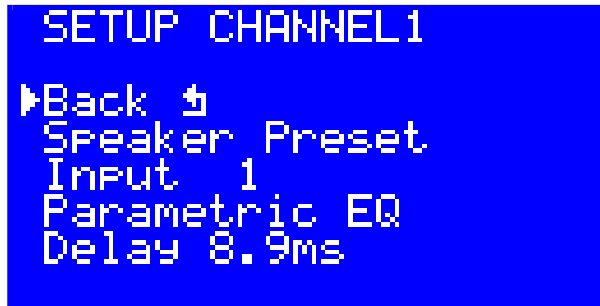
### Link EQ/Delay

In 'Dual channel mode', you can choose to link the equaliser and/or the delay function.

# 5. Operation

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## Setup channel1/2 menu



### Back

Returns to the setup menu.

### Speaker preset

Enters the menu in which the Alcons system presets are defined.

### Input 1/2/12

Controls the input matrix for the selected channel. You can choose between Input 1, Input 2 or the sum of Inputs 1&2 with 6 dB attenuation.

### Parametric EQ

Enters the parametric equaliser.

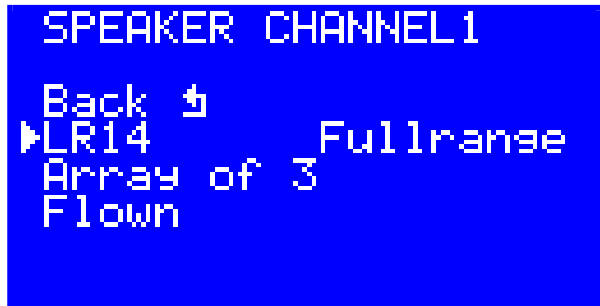
### Delay off/..ms/..m

Enters the delay function. If the delay is on, the delay value is displayed in the units selected in the delay menu (ms/m). Otherwise **off** is displayed.

## 5. Operation

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### Selecting the Alcons System presets



After selecting the speaker preset menu option in the setup menu, you can select the loudspeaker preset from the Alcons loudspeaker library. After selecting the system preset, you are asked to confirm changing the system preset. By choosing **no**, you can return to the previously selected system preset. If mute on preset change is selected in the options menu, the DDP will mute the current channel and **unmute?** is displayed. You can choose to unmute this channel now, or eventually later in the main menu.

For some presets one or two extra menu items are displayed to adjust one or two more parameters associated with that preset. In this example, in the LR14 preset the array length can be adjusted from 3 to 24 cabinets and a flown or ground-stacked array can be selected.

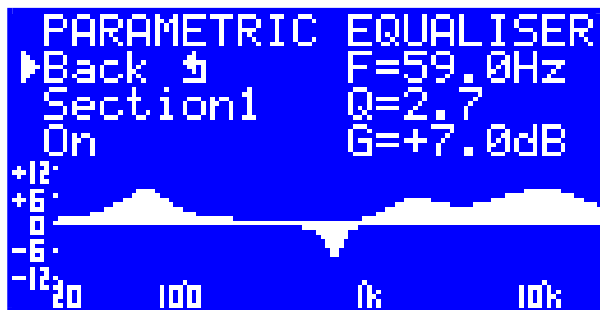
# 5. Operation

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## Parametric equaliser

The DDP has a 4 band per channel parametric equaliser providing boost/cut or notch filtering independently for both channels. In Dual channel mode the channel 1 and channel 2 equalisers can be linked using the link option in the setup menu.

A visual indication of the frequency response of the equaliser is also shown. If the area under the curve is not filled, it indicates the equaliser is switched off in the DDP main menu.



### Back

Exits the equaliser and returns to the setup channel1/2 menu.

### Section1/2/3/4

Selects the section or band of the equaliser to be adjusted.

### On/Bypass

Toggles the selected band of the equaliser on and off.

### F

Changes the centre frequency of the filter. Adjustable from 20 Hz to 20 kHz in 1/12<sup>th</sup> octave steps.

### Q

Changes the Q of the filter. Adjustable from 0.3 to 15 in 38 steps.

### G

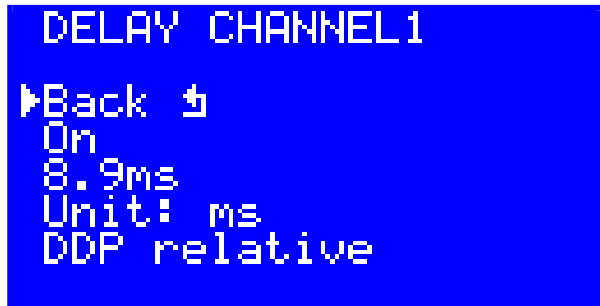
Changes the gain of the filter from -20 to +12 dB in 0.5 dB steps. Turning the encoder below -20 dB selects a notch filter.



# 5. Operation

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## Delay



### Back

Returns to the setup channel1/2 menu.

### On/Off

Switches the delay on or off without changing the entered delay time.

### ..ms/m

Enters the delay time in milliseconds (ms) or in meters (m) in steps of 0.1 ms or 0.01 m for values up to 29 ms or 9.7 m and in steps of 1 ms or 0.1 m above these values. The maximum values that can be entered here are 293 ms or 99.6 m. In absolute delay mode, these numbers are increased with 1 ms or 0.3 m. The entered value becomes the actual delay time only after confirmation by pressing the encoder.

### Unit: ms/m

Toggles between units milliseconds (ms) or meters (m).

### DDP relative/absolute

Toggles between relative and absolute indication of the delay time. Relative mode shows the delay time relative to the delay off mode. Absolute mode shows the delay time including the latency of the A to D and D to A converters.

# 5. Operation

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## User presets

```
USER PRESETS
▶Back ↵
Preset: Preset 1

Recall?
Store?
Change name
```

In the DDP up to 99 user-presets can be made, consisting of factory system preset, gain, mute, input-mode, equalising and delay. These presets can be tagged with a 21-character name which is also shown at the top of the main menu.

### Back

Returns to the setup menu.

### Preset:...

Selects one of 100 presets. The first preset is the 'DigitalDriveProcessor' preset which cannot be overwritten or has its name changed. You recall this preset to reset all the DDP settings at once.

After selection of the desired preset it must be recalled or stored. To indicate this a question mark, ? is displayed behind Recall and Store.

### Recall (previous)

After selection of the desired preset, pressing Recall, recalls all settings from this preset. The current settings of the DDP are lost. After pressing Recall, the indication switches to the recall previous function. You can now switch the DDP back and forth between the current and previously selected preset.

### Store

After selection of the desired preset, pressing Store, stores all current settings of the DDP to this preset. Any previous settings stored in this preset are overwritten.

## 5. Operation

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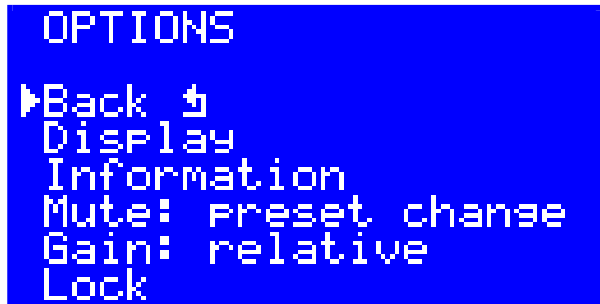
### **Change name**

After recalling or storing a preset, its name can be edited using the Change name function. A name consisting of a maximum of 21 characters can be given to a preset and this name is also shown on the top line of the main menu.

# 5. Operation

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## Options menu



### Back

Returns to the main menu.

### Display

Enters the display menu.

### Information

Enters the information menu.

### Mute: off/power up/preset change/pwrup+prst chg

Toggles between: **off**: The DDP is never automatically muted. **power up**: The DDP is always muted when switched on, **preset change**: The DDP is always muted when a system or a user preset is recalled. **pwrup+prst chg**: The DDP is always muted when switched on and when a system or user preset is recalled.

### Gain: relative/absolute

Toggles between gain indication in the main menu **absolute**: The indicated gain is the actual gain of the DDP+ALC combination. **Relative**: The indicated gain is relative to the gain of the ALC amplifier (+32 dB).

### Lock

Enters the lock menu.

# 5. Operation

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## Display menu



### Back

Returns to the options menu.

### Contrast..

Changes the contrast of the LCD in 10 steps.

### Backlight..

Changes the intensity of the backlight in 10 steps.

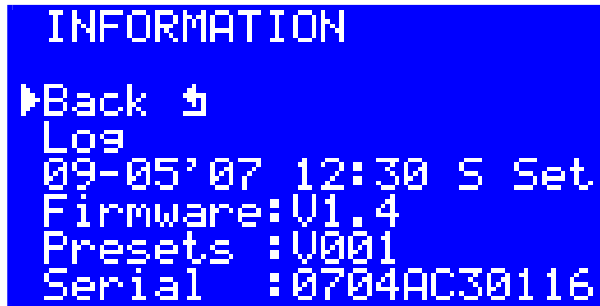
### Timeout Off/10s

Toggles between: **Off**: the backlight is always on, but after 10 seconds of no operation the backlight is dimmed. **10s**: After 10 seconds of no operation the LCD is cleared and the backlight is switched off. The LCD and backlight are switched back on when you turn or push the encoder.

# 5. Operation

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## Information menu



### Back

Returns to the setup menu.

### Log

Enters the log menu.

### Date Time Set

Here the actual date and time are displayed. The S or W character indicate summer or wintertime and that the clock is automatically adjusting for daylight savings. Pressing the encoder enters the set clock menu.

### Firmware:V...

Shows the current firmware version.

### Presets:V...

Shows the current Alcons loudspeaker system presets library version.

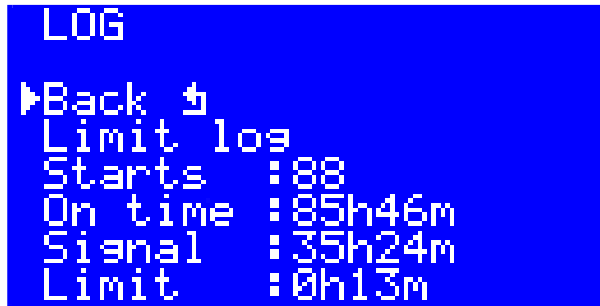
### Serial:...

Shows the unique serial number of this module.

## 5. Operation

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### Log menu



#### **Back**

Returns to the information menu

#### **Limit Log™**

Enters the Limit Log™ menu.

#### **Starts:...**

Shows the number of times the module has started.

#### **On time:...h..m**

Shows the total time the module has been switched on in hours and minutes.

#### **Signal:...h..m**

Shows the total signal present time of the module in hours and minutes.

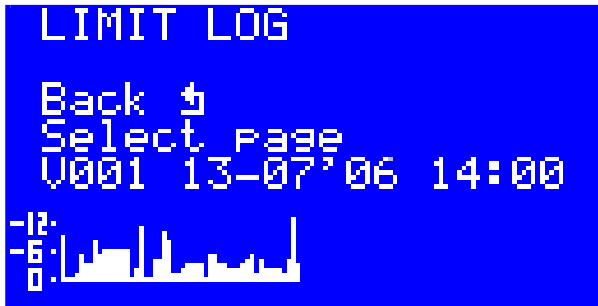
#### **Limit:...h..m**

Shows the total limiting time of the module in hours and minutes.

## 5. Operation

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### Limit Log™ menu



In the Limit Log™ menu the limiting actions of the DDP over the last 7167 hours of operating time are recorded. Of each minute the maximum amount of limiting in that minute of both channels is recorded. The menu displays a visual graph of the current log page. Each page represents one hour of operating time.

#### **Back**

Returns to the log menu.

#### **Select page**

Here you can scroll back to previously recorded hours in the logbook. The DDP Limit Log™ has a circular memory. This means that after 7167 hours the first recorded hour will be overwritten by the latest (7168<sup>th</sup>) hour.

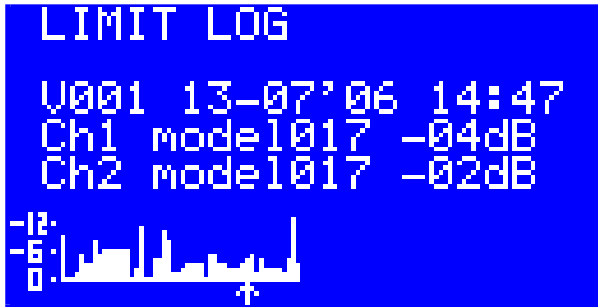
#### **V... date time**

Shows the Alcons loudspeaker system presets library version number and the date and time of the first minute sample recorded on this page.



## 5. Operation

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Pushing the encoder switches the Limit Log™ screen to the example shown above. The cursor changes to an arrow which points to one particular minute in this page. The screen shows the exact date and time, and for each channel the model from the system presets library and the amount of limiting in that minute. Pushing the encoder returns to the previous screen. In appendix A you can see which presets correspond to the model numbers shown in the Limit Log.

## 5. Operation

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### Set clock menu



```
SET CLOCK
Set year      :2007
Set month     :05
Set date      :10
Set hours     :11
Set minutes   :29
DST adjust    :Eur
Date format   :dd-mm'yy
```

#### **Set year:20..**

Enter the current year.

#### **Set month:..**

Enter the current month.

#### **Set date:..**

Enter the current date.

#### **Set hours:..**

Enter the current hour in 24 hour format.

#### **Set minutes:..**

Enter the current minute.

#### **DST adjust:Off/Eur/USA**

The DDP can automatically adjust for daylight saving time. **Off**: Do not automatically adjust the time for daylight savings. **Eur**: Adjust the time according to the European standard for daylight savings. **USA**: Adjust the time according to the American standard for daylight savings.

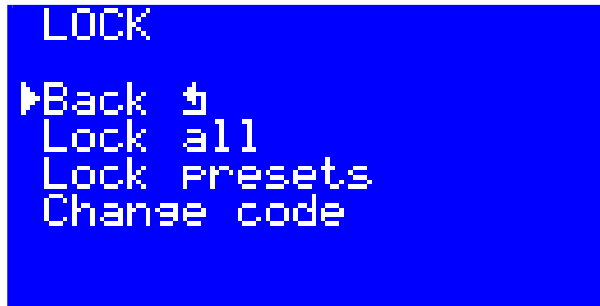
#### **Date format:dd-mm'yy/mm-dd'yy**

Changes the format in which the date is displayed.

# 5. Operation

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## Lock menu



### Back

Returns to the options menu.

### Lock all

This function locks all settings of the DDP except for the mute functions in the main menu. All menus in which settings can be examined remain accessible.

### Lock presets

This function locks only the settings that can change a system preset. This means that besides the system presets, also the user presets cannot be recalled and also the DDP cannot be switched to another operating mode (dual channel mode, stereo mode, bridged mono mode or 2-way active mode). All other settings are still accessible.

After selection of the Lock all or the Lock presets function the DDP asks for your lock-code. The lock-code is factory set at **0000**.

### Change code

To change the factory set lock code from **0000** to your own code, or to change the lock code you use the change code function. The DDP asks for the current lock code and after that for the new lock code.

### Unlock

If the DDP is locked by either the Lock all or the Lock presets function, the Unlock menu item is displayed. To unlock the DDP, select this function. The DDP asks for the lock-code and will then suspend the lock function.

## 6. The DDP Bootloader

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### Installing the Bootloader software

To Install the Alcons DDP Bootloader software, follow this procedure:

- Make a new folder in which you want to install the DDP Bootloader.  
For instance: C:\Alcons\DDP Bootloader.
- Extract all files from the DDP\_bootloader\_Vxx.zip file to this folder.
- Extract all files from the DDP\_firmware\_Vxx.zip file to this folder
- Connect the DDP module to one of the USB ports of your computer.
- Your computer will start the Add new hardware wizard.
- Select: Search for the best driver for your device.
- Select: Specify a location and browse to the folder you created in the first step.
- Complete the driver installation procedure
- Click on the DDPbootloader.exe file. The bootloader program should open like this:



## 6. The DDP Bootloader

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- Click on the button 'Check connection'
- The program should reply with: 'Connection...OK'
- The installation is now finished.

### Performing firmware upgrades

To upgrade the DDP with a new firmware version, the module must be removed from the ALC amplifier. Connect the module to your computer with a USB cable. The module should reply with: **BOOTMODE**. Start the DDP Bootloader program. Press the Load file button and select the firmware file you want to load into the module. Now press the Program device button. Wait for the procedure to complete and then disconnect the module. The firmware upgrade is now complete. Reinstall the module.

### Adjusting the DDP while connected to your computer

When you connect the DDP to your computer while pressing the encoder, instead of going into bootmode, the DDP starts up normally, and adjustments to it can be made. It is possible that your computer does not recognise the DDP in this mode, and displays an error. You can simply ignore this, as the error disappears when you disconnect the DDP.

# 7. Service and support

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## Warranty

### Summary

Alcons Audio BV warrants the original purchaser and any subsequent owner of each new Alcons product, for a period of three years from the date of the original purchase by the original purchaser that the new Alcons product is free of defects in materials and workmanship. Alcons Audio BV warrants the new Alcons product regardless of the reason for failure, except as excluded in this warranty. In order to obtain warranty, you must keep the original sales receipt to establish the exact date of purchase.

### Items excluded from warranty

Warranty does not cover any product which has been damaged because of any misuse, accident, or negligence. Warranty also does not extend to a new Alcons product if the serial number has been defaced, altered or removed.

### What we will do

Alcons Audio BV will replace defective parts and repair malfunctioning products, regardless of the reason for failure (except as excluded). Warranty work can only be performed at our authorized service centres, or at our factory.

### Disclaimer

Alcons Audio BV is not liable for any damage to loudspeakers, amplifiers, or any other equipment that is caused by negligence, misuse or improper installation of the ALC amplifiers. Alcons Audio BV is not liable for any incidental damages resulting from any defect in the new Alcons product. This includes any damage to another product or products resulting from such a defect.

Alcons Audio BV reserves the right to change specifications without notice.

## 7. Service and support ---

### **Contact information**

#### **Mailing address:**

Alcons Audio BV  
De Corantijn 69  
1689 AN ZWAAG  
The Netherlands

#### **Telephone / Facsimile:**

Telephone: +31 (0)229 283090  
Fax.: +31 (0)229 283099

#### **World Wide Web:**

<http://www.alconsaudio.com>

#### **E-mail:**

[info@alconsaudio.com](mailto:info@alconsaudio.com)

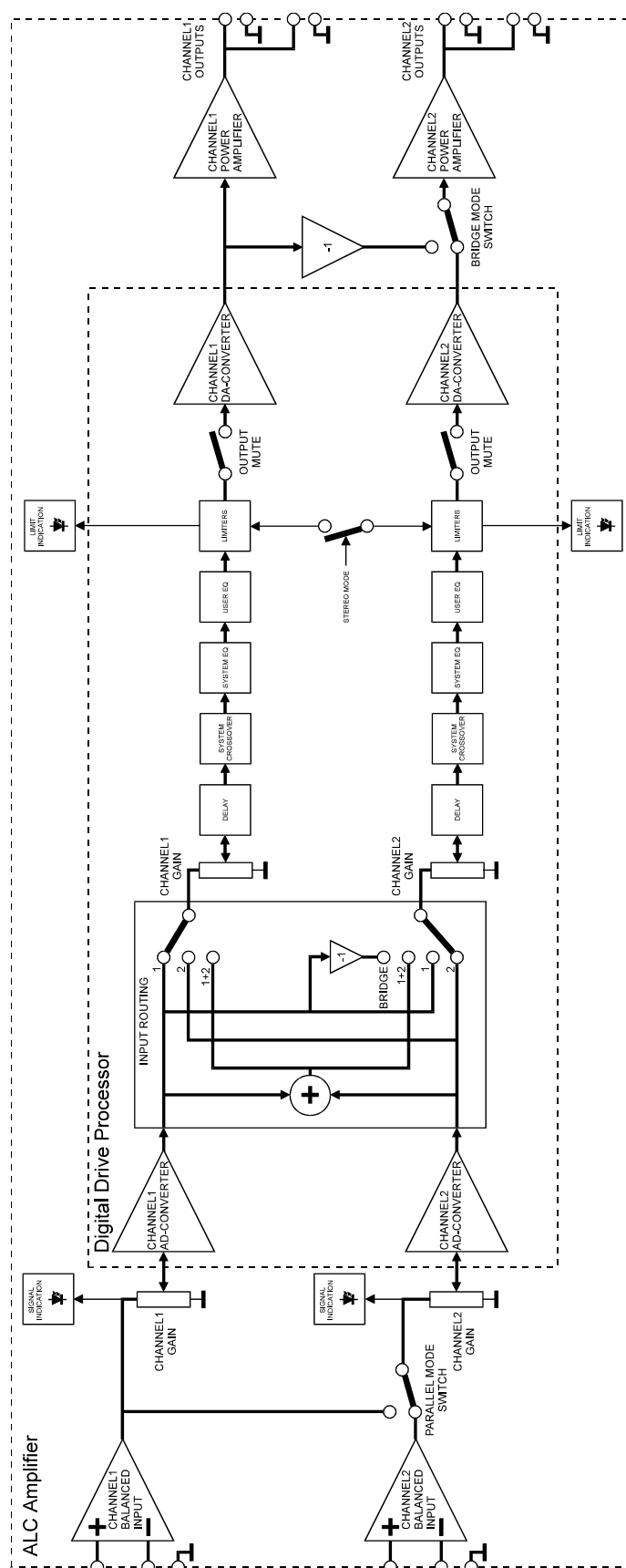
## 8. Specifications

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AD Converter	_____ Delta sigma 24 bit 96 kHz 128x over sampling
DA Converter	_____ Delta sigma 24 bit 96 kHz 128x over sampling
Frequency response	_____ <10 Hz .. 46kHz -3 dB
Channel separation	@ 1 kHz _____ >85 dB
	@ 20 kHz _____ >80 dB
THD+N	@ 20 Hz - 20 kHz _____ <0.010 %
SMPTE IMD	@ 2 kHz – 10 kHz _____ <0.015 %
S/N ratio	_____ >112 dB A-wght
Latency	_____ 0.95 ms
Gain control	_____ -62 .. +6 dBr
Equaliser	_____ 2x 4 band parametric / notch filter
Delay	_____ 293 ms or 99.6 m per channel
System presets	_ All currently available Alcons loudspeaker cabinets
User presets	_____ 99 user definable
Security lock	Lock all or lock presets only with four digit lock-code
Display	_____ Backlit graphic LCD 128x64 dot
Control	_____ Digital rotary encoder
Weight	_____ 0.3 kg / 0.66 lb
Dimensions	_____ 50x240x32 mm / 2.0x9.5x1.3 inch (hwxwd)



# 9. Block diagram



# Appendix A

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## Alcons loudspeaker system presets library V001

Model 000	Linear		Model 030	LR16 lf	Fullrange
Model 001	BF151	100Hz	Model 031	LR16 lf	75Hz
Model 002	BF151	80Hz	Model 032	LR16 lf	160Hz
Model 003	BF151	75Hz	Model 033	LR16B	40-160Hz
Model 004	BF181	100Hz	Model 034	LR16B	40-75Hz
Model 005	BF181	80Hz	Model 035	LR16B	80-160Hz
Model 006	BF181	75Hz	Model 036	QB363	100Hz
Model 007	BF181	100Hz cardioid	Model 037	QB363	75Hz
Model 008	BF181	80Hz cardioid	Model 038	QM18/QM36	Fullrange
Model 009	BF181	75Hz cardioid	Model 039	QM18/QM36	75Hz
Model 010	BF302	100Hz	Model 040	QM18/QM36	100Hz
Model 011	BF302	80Hz	Model 041	QR18/QR36	Fullrange
Model 012	BF302	75Hz	Model 042	QR18/QR36	75Hz
Model 013	BF362	100Hz	Model 043	QR18/QR36	100Hz
Model 014	BF362	80Hz	Model 044	SR9	Fullrange
Model 015	BF362	75Hz	Model 045	TS3/TS7	Fullrange
Model 016	CB181/362	100Hz	Model 046	TS3/TS7	100Hz
Model 017	CB181/362	80Hz	Model 047	VR8	Fullrange
Model 018	CCS8	Fullrange	Model 048	VR8	75Hz
Model 019	CR1	Fullrange	Model 049	VR8	100Hz
Model 020	CR2 lf	Fullrange	Model 050	VR12	Fullrange
Model 021	CRMS sub	150Hz	Model 051	VR12	75Hz
Model 022	CRMS top	Fullrange	Model 052	VR12	100Hz
Model 023	CRMS top	150Hz	Model 053	VR12-60	Fullrange
Model 024	LR14	Fullrange	Model 054	VR12-60	75Hz
Model 025	LR14	75Hz	Model 055	VR12-60	100Hz
Model 026	LR14	160Hz	Model 056	CR2 mf/hf	
Model 027	LR14B	45-160Hz	Model 057	LR16 hf	
Model 028	LR14B	45-75Hz	Model 058	LR16 hf	
Model 029	LR14B	80-160Hz	Model 059	LR16 hf	